softDSP

User's Guide

- SDS 200 -

- SoftScope 1.1-

PC Based Digital Oscilloscope

www.softdsp.com

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FCC NOTICE

THIS DEVIDE COMPLIES WITH PART 15 OF THE FCC RULES.
OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITION:
(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDERSIRED OPERATION.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit difference from that to which the receiver is connected.
- Consult the dealer of an experienced radio/TV technician for help.

NOTE: The manufacturer is not responsible for any radio or TV interference cause by unauthorized modifications to this equipment. Such modifications could void the user' s authority to operate the equipment.

Declaration

of

Conformity

Reference Report No.: SKTCE-010524-109T

Regarding the Certification of products which are in the scope of the

Council directive(s) 89/336/EEC

the Manufacturer

softDSP Co., Ltd.

179-2, Bangi-Dong, Songpa-Ku,

Seoul, Korea

has demonstrated successfully that its product

PC Based Digital Oscilloscope

SDS 200

is in compliance with

EN 61326:1997 +A1:1998

Electrical equipment for measurement, control

and laboratory use-EMC requirements

EN 55011:1998 +A1:1999 Group II Class B (EMI)

EN 50082-1:1997(EMS) (EN 61000-4-2:1995 +A1:1998,

EN 61000-4-3 :1996+A1:1998, EN 61000-4-4:1995,

EN 61000-4-5:1996, EN 61000-4-6:1996, ENV 50204:1995)

We, the undersigned, hereby declare above equipment conforms

to the 89/336/EEC Directive(s)

CE

Cho, Sung Min

Chief Engineer & Quality Assurance Manager

WARRANTY

This softDSP instrument product is warranted to be free from defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, softDSP Co., Ltd. will at its option, either will repair or replace the defective product.

But, the foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

Product Name	PC Based Digital Oscilloscope
Model Name	SDS 200
Warranty Period	one year from the date of purchase
At the time of purchase	

ASSISTANCE

Product maintenance agreements and other customer assistance agreements are available for softDSP.

For any assistance, contact your nearest softDSP Sales and Service office. Addresses are provided in this manual.

Our homepage address is "http://www.softdsp.com".

SAFETY SUMMARY

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to a softDSP Sales and Service Office for service and repair to ensure that safety features are maintained.

Observe Maximum Working Voltage

Do not use this product on bare wires above 42Vpk, AC 30Vrms and DC 60V.

Product Damage Precautions

Do not open the cover and attempt any repairs. An electric shock or accident may be caused by opening the cover or improper handling. If you suspect there is damage to this product, you must have it inspected by qualified service personnel.

Do not drop the product. This product contains fragile components that can be damaged by high impact. Take care to prevent the product from dropping on the floor or other hard surfaces.

To avoid electric shock, do not operate this product in wet or damp conditions.

Do not operate near flammable materials.

Minimum System Requirements

To install and run SoftScope, you should have the following;

Operating System

Windows 98/ME/2000

CPU/Mainboard

Pentium 200MHz , USB equipped mainboard

Memory

32MByte

HDD

20MByte

Graphic Card

Microsoft DirectX supported

Screen resolution: 800x600

Color depth: 16bit

Memory : 8MBytes or more

Waveforms may not be displayed properly or SoftScope may not run on the graphic card equipped with 2Mbyte or 4Mbyte memory.

5 different kinds of SoftScope with different display mode

1. DirectX direct mode - SoftScopeDirect.exe
 - The fastest screen update, but some graphic cards don't work in this mode.

2. DirectX Surface mode - SoftScope.exe
 - Default mode,

3. DirectX system memory mode - SoftScopeSystem.exe

4. DirectX system memory Surface - SoftScopeSystemSurface.exe
 - If your graphic card is equipped with 2Mbyte/4Mbyte memory, you must use this mode.

5. GDI mode - SoftScopeGDI.exe
 - If all of the above graphic mode don't work.you must use GDI mode.

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Ch 1. Introduction

1. What is SDS 200/SoftScope ?

SDS 200

SDS 200 developed by softDSP Co., Ltd. is a portable PC-based Digital Oscilloscope.

High performance

SDS 200 has the following features: 200MHz analog bandwidth, 5GS/s equivalent sampling, 100MHz real-time sampling.

USB connected

SDS 200 uses USB that supports plug' n play, with 12Mbps communication speed.

Advanced trigger

SDS 200 has advanced trigger circuitry so that it can detect many complex signals.

Best performance for your dollar

SDS 200 has many features that is comparable to the high speed stand-alone DSOs. But it costs a fraction of the price.

No external power required

SDS 200 does not need an external power source, because it is bus-powered from USB.

SoftScope

SoftScope is a Windows software that controls SDS 200.

Easy to use

SoftScope is easy to use. It is intuitive and easy to understand.

Big screen

SoftScope uses 500 x 400 screen size.

Various data format processing

SoftScope can save waveform in the following formats: text file, jpg/bmp graphic file, MS excel/word file.

Fast screen update rate

SoftScope uses Microsoft DirectX, so that it gives upto screens per second update rate. (under Windows98, Pentium II environment)

Many kinds of measurements

SoftScope has 23 measurement functions.

The analog scope effect

SoftScope uses digital persistence and histogram method so that the display resembles an analog oscilloscope screen.

2. Hardware Specification

Input	
Max. sample rate	Realtime sampling: 100MS/s using one channel, 50MS/s using two channels Equivalent sampling: 5GS/s
Channels	2
Bandwidth	200 MHz (-3dB) Single shot bandwidth:50MHz
Vertical resolution	9 bits/channel
Gain range	10mV ~ 10V/div @ x1 probe (10mV, 20mV, 50mV, 100mV, 200mV, 500mV, 1V, 2V, 5V, 10V/div 1,2,5 sequence) 100mV ~ 100V/div @ x10 probe 1V ~ 1000V/div @ x100 probe
Range	8 divisions
Offset level	+/-4 divisions
Coupling	AC, DC
Offset increments	0.02 div
Impedance	1M ohm
DC accuracy	+/-3%
Input protection	42Vpk (DC + peak AC < 10 kHz, without external attenuation)
Timebase	
Timebase range	2ns/div ~ 10s/div (2ns, 4ns, 10ns, 20ns, 40ns, 100ns, 200ns, 400ns, 1us, 2us, 4us, 10us, 20us, 40us, 100us, 200us, 400us, 1ms, 2ms, 4ms, 10ms, 20ms, 40ms, 100ms, 200ms, 400ms, 1s, 2s, 4s, 10s /div 1-2-4 sequence)
Acquisition mode	Equivalent sampling: 2ns/div ~ 4us/div Realtime sampling: 10us/div ~ 400ms/div Roll mode: 1s/div ~ 10s/div
Range	10 divisions
Pre/Post trigger	0% ~ 1000%
Time resolution	200ps
Buffer size	10K samples

Trigger	
Type	Edge trigger: Rising edge, falling edge Logic trigger: AND, NAND, OR, NOR, XOR, XNOR Pulse trigger: Less than width, more than width (10ns ~ 167ms) Delay trigger: By event (1~16,777,215), by time (10ns ~ 167ms)
Mode	Auto, Normal and Single
Autoset	Yes
Range	10 divisions
Trigger level	+/-4 divisions
Settabillity	0.02 div increments
Math	
Measurements	Vp-p, Vmax, Vmin, Vmean, Vrms, Vamp, Vhigh, Vlow, positive overshoot, negative overshoot, cycle mean, cycle rms, period, frequency, positive pulse width, negative pulse width, rise time (10%~90%), fall time (10%~90%), positive duty cycle, negative duty cycle
Cursor	Time/frequency difference, voltage difference Frequency only in FFT mode
Math	Addition, Subtraction, Multiplication, Division
FFT	Rectangular, Hanning, Hamming, Blackman Window
Physical	
Interface	Universal Serial Bus (USB)
Power	No external power source required. Bus-powered from USB
Dimensions	5.1" x 4.4" x 1.5"

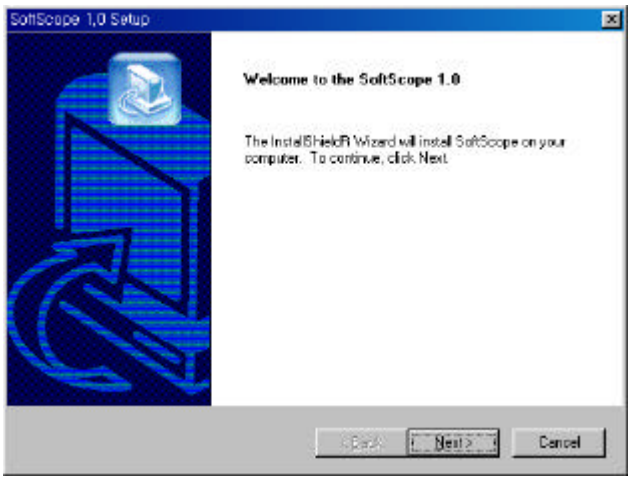
3. SoftScope Installation

Caution!) You must install 'SoftScope' before using SDS 200.

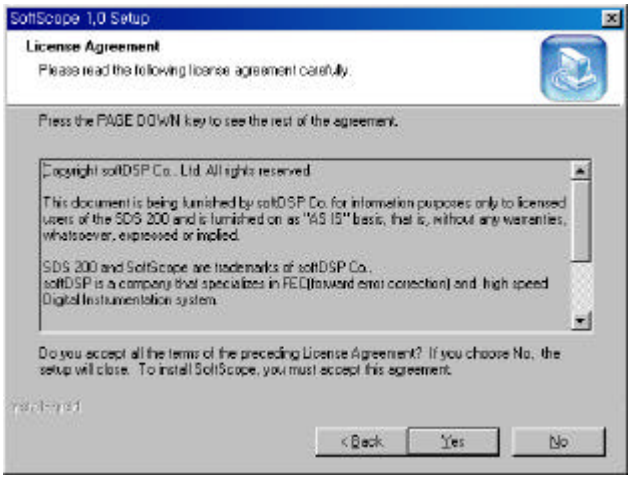
1. While in Windows, insert the installation CD into the CD-ROM drive.

2. The installation should start up automatically. Otherwise in Windows Explorer, switch to the CD-ROM drive and run Setup.exe.

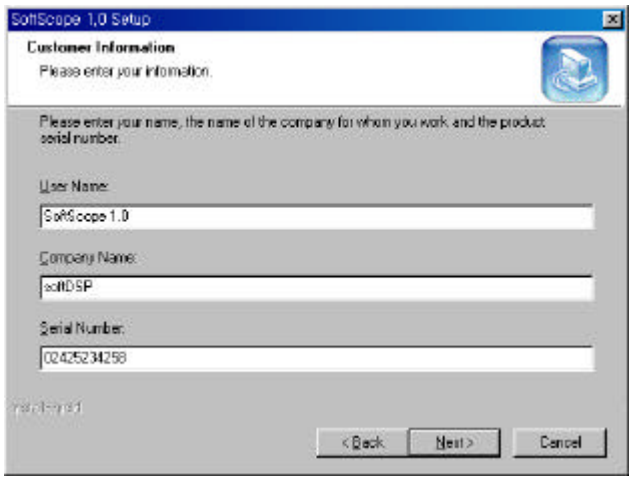
3. The SoftScope Installation is started. Click Next to continue.


SoftScope 1.0 Setup
Welcome to the SoftScope 1.0
The InstallShield® Wizard will install SoftScope on your computer. To continue, click Next.
< Back
Next >
Cancel

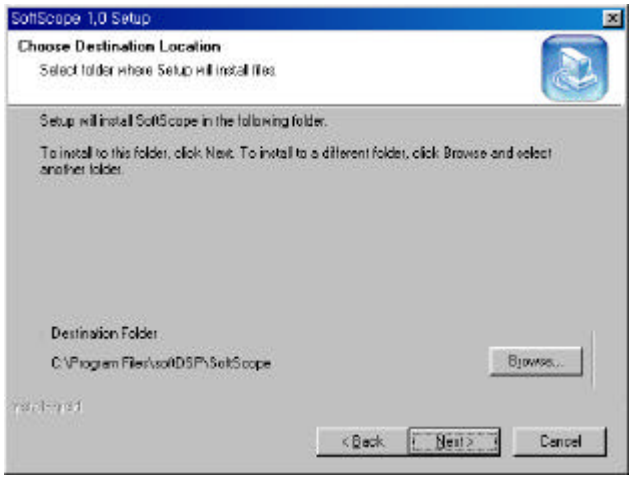
4. If you accept the license agreement, click Yes to continue.


SoftScope 1.0 Setup
License Agreement
Please read the following license agreement carefully.
Press the PAGE DOWN key to see the rest of the agreement.
Copyright softDSP Co., Ltd. All rights reserved.
This document is being furnished by softDSP Co. for information purposes only to licensed users of the SDS 200 and is furnished on an "AS IS" basis, that is, without any warranties, whatsoever, expressed or implied.
SDS 200 and SoftScope are trademarks of softDSP Co.
softDSP is a company that specializes in FEC(forward error correction) and high speed Digital Instrumentation system.
Do you accept all the terms of the preceding License Agreement? If you choose No, the setup will close. To install SoftScope, you must accept this agreement.
< Back
Yes
No

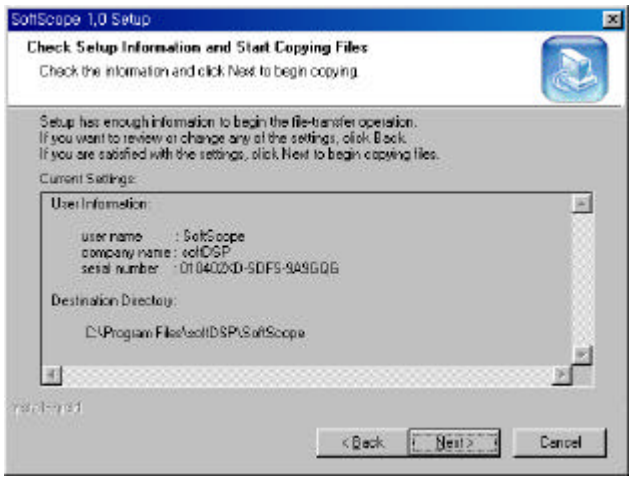
5. Fill in the user information and serial number. Click Next to continue.



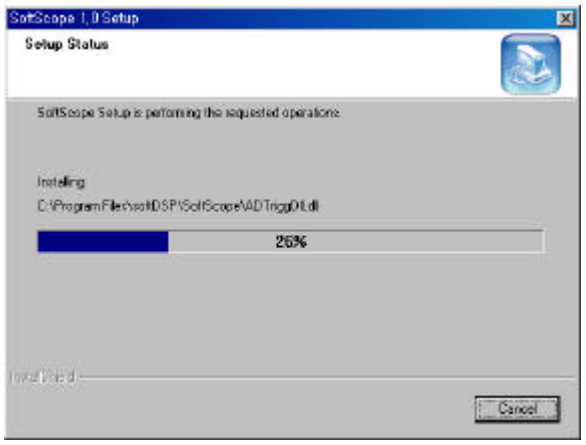
6. Choose a destination directory. Click Next to continue.


SoftScope 1.0 Setup
Choose Destination Location
Select folder where Setup will install files.
Setup will install SoftScope in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\softDSP\SoftScope
Browse...
< Back
Next >
Cancel

7. Check the setup information. Click Next to start copying of files.


SoftScope 1.0 Setup
Check Setup Information and Start Copying Files
Check the information and click Next to begin copying.
Setup has enough information to begin the file-transfer operation.
If you want to review or change any of the settings, click Back.
If you are satisfied with the settings, click Next to begin copying files.
Current Settings:
User Information:
user name : SoftScope
company name : softDSP
serial number : 01040ZKD-SDFS-9A9GQG
Destination Directory:
C:\Program Files\softDSP\SoftScope
< Back
Next >
Cancel

8. This Status dialog is displayed during copying of files.



9. After Installing SoftScope, the installation program will check the DirectX version of your computer. If it is later than 6.0, the installation program will skip the DirectX Setup.

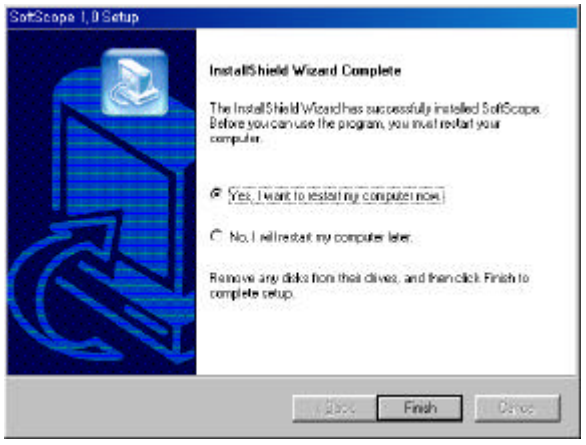
9.1 If it is earlier than 6.0, the DirectX Setup will start up automatically.

9.2 Follow the directions of the DirectX Setup.

9.3 You will see the Restart message box in the last step of DirectX Setup. Click Ok, but your computer will not restart in this step, it will go to step 10.

Caution!) You must install DirectX 6.0 or later to use SoftScope.

10. Check Yes and click Finish to reboot your computer.


SoftScope 1.0 Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed SoftScope. Before you can use the program, you must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
Back
Finish
Cancel

Caution!) Reboot your computer to use SoftScope correctly.

11. The installation is complete.

4. SDS200 Setup

Caution!) SoftScope must be installed before using SDS 200. This setup process is done once; at the first time of connection.

1. Connect the A-Type Plug of USB cable to your PC's USB port.

2. Connect the B-Type Plug of USB cable to SDS 200's USB port.

3. SDS 200 will be detected automatically. (The picture is captured under Windows98 SE environment)

5. Setup sds200.inf Manually

When sds200.inf file is not be detected automatically, you see the following dialog box.

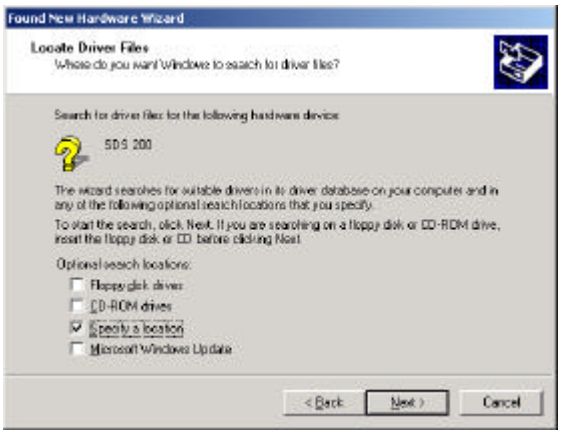
Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

In this case you must install sds200.inf file manually.

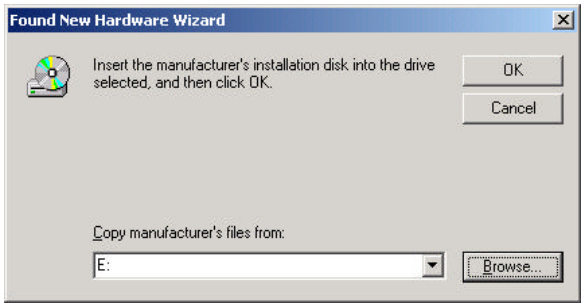
1. Choose ' Search for a suitable driver for my device' button. Click Next to continue.

Found New Hardware Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
SDS 200
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

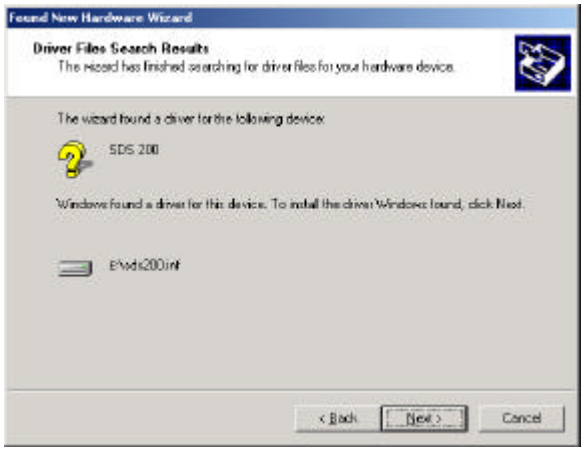
2. Specify a location. Click Next to continue.


Found New Hardware Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
SDS 200
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

3. The sds200.inf file is located in SoftScope CD-ROM root directory. Specify the location by either entering or browsing.



4. sds200.inf file is detected automatically. Click Next to continue.


Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
SDS 200
Windows found a driver for this device. To install the driver Windows found, click Next.
E:\sds200.inf
< Back
Next >
Cancel

5. Click Finish.

6. Warning!

We recommend using High Color(16 bit) mode. With some graphic cards with 32 bit color depth, SoftScope doesn't work. SoftScope doesn' t support 24 bit color mode.

If you see the following error message when you run SoftScope. Check the following two items.

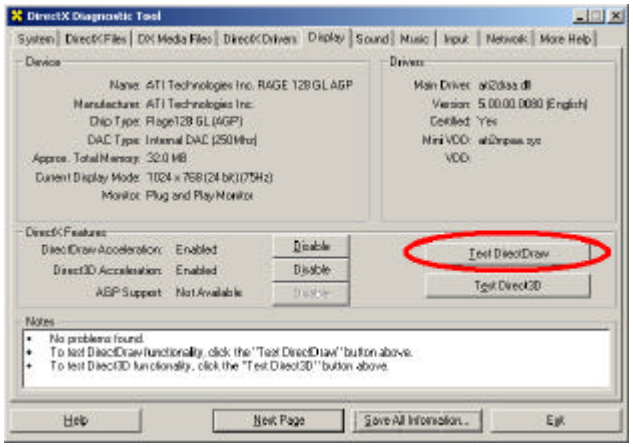
Error
Direct Draw Init Failed (8876017c)
we recommend you to change graphic card into High Color(16 bit) mode or reinstall DirectX 6.0 or more.
OK

Check if DirectX is installed and work well.

Under Window98 environment, run DXDiag.exe which is in C:\Program Files\DIRECTX\SETUP directory(The default directory may be different if you choose other directory at DirectX setup).

Under Windows2000 environment, run DXDiag.exe which is in C:\WinNT\System32.

Under WindowsME environment, run DXDiag.exe which is in C:\WinNT\System.

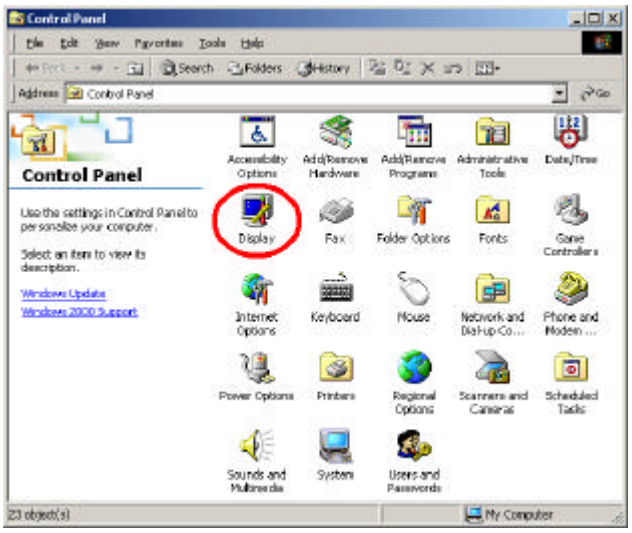


In the <display> section, run <DirectDraw Test>.

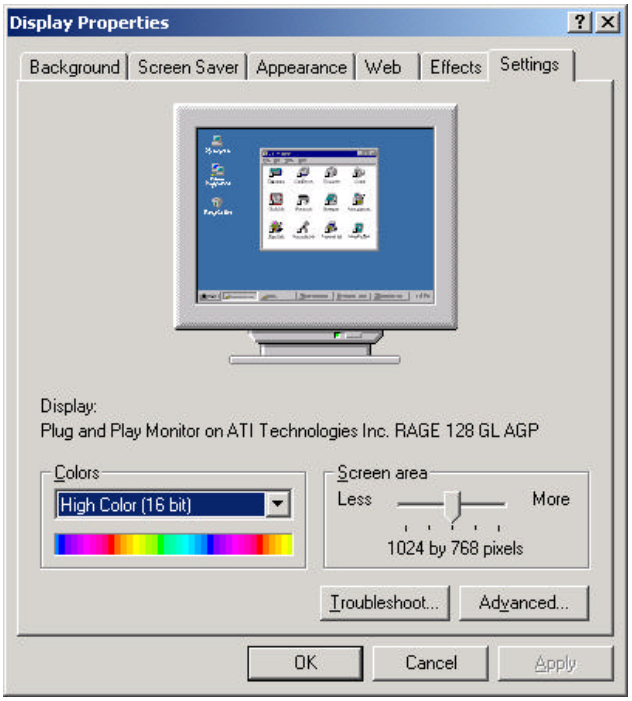
Check if DirectX works well.

Check if you're using High Color(16 bit) mode.

Under Control Panel choose ' Display' applet.



3. Set High Color (16bit) mode and click OK to continue.



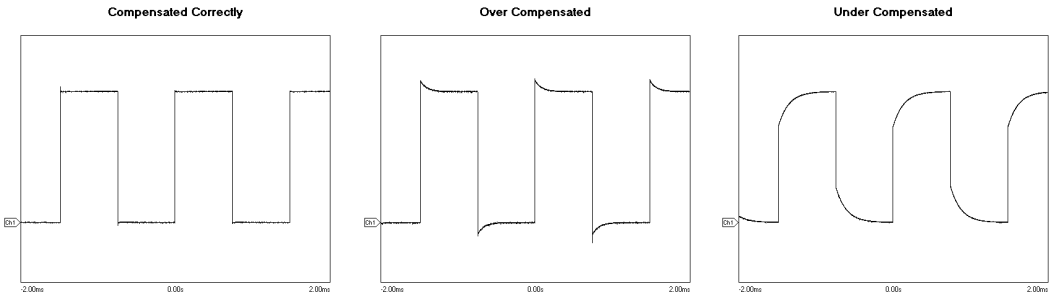
7. Calibration

SDS 200 calibration

1. When manufactured, SDS 200 is calibrated manually to obtain maximum performance.
2. You may calibrate SDS 200 5 or 6 months after purchase.

Probe Compensation

1. You must use a probe with more than 200MHz bandwidth to get undistorted signal.
2. Probe should be compensated whenever it is connected for the first time.
3. Connect calibration signal to channel 1, then push AUTOSET.
4. Check the shape of the displayed waveform.
5. Adjust the probe until the displayed waveform is compensated.



Ch 2. How to use SDS 200/SoftScope

1. Simple Measurement

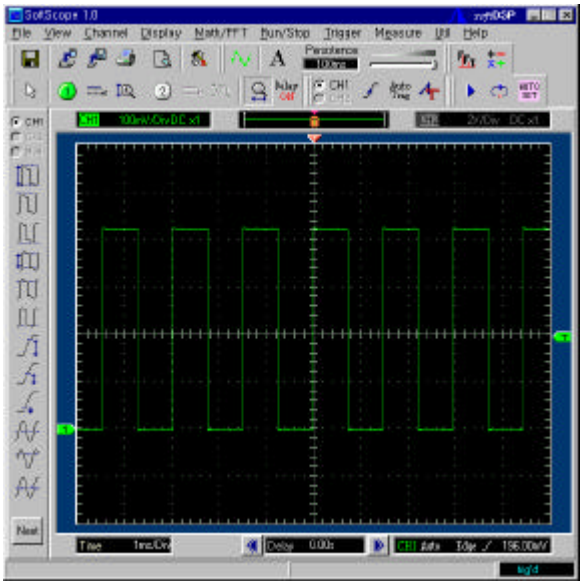
1. Start SoftScope.
2. SoftScope checks the internal state of SDS 200, USB communication status and then read initialization data.

3. Connect channel 1 probe to the calibration terminal.

4.

Push the autoset button.

5. SoftScope sets vertical/horizontal scale automatically.



6. Join dots to a solid line.

A. SoftScope displays the data from SDS200 as a dotted line.

B. To see the waveform more clearly, push the line-join icon.

7. Add persistence effect.

A. Persistence effect is analog-scope like effect that remembers the history of displayed waveforms. With persistence effect, you can see the more frequent line clearer.

B. Change the persistence effect coefficient.

8. Change the intensity of the waveform.

A. Just as in changing the persistence effect, you can change the intensity.

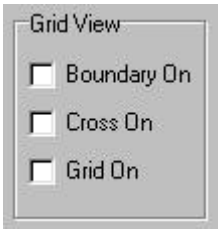
B. By changing the scroll bar in the menu, you can see a more/less distinct line.

9. Waveform display under 4us/div time scale

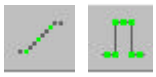
You can choose between ETS(Equivalent Time Sampling) mode and RTS(Real Time Sampling) mode by pressing ETS ON /OFF Button. You can join the dots at each mode by pressing LINE JOIN ON /OFF button.

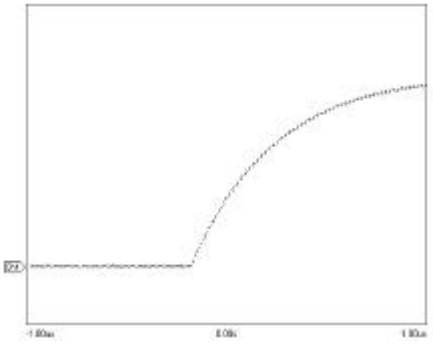
A. Set horizontal scale to 200ns/div.

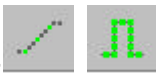
B. At option dialog box, uncheck the setting not to display grid

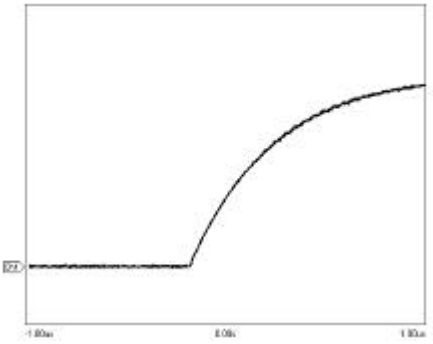


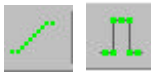
C. SoftScope displays waveform as the following 4 ways.

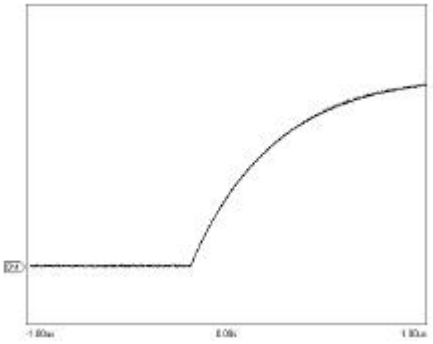
<Real time mode > 



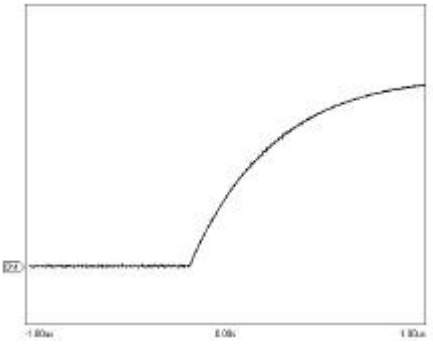
<Real time mode + Line join> 



<ETS mode> 



<ETS mode + Line join>



SoftScope can not display 50MHz waveform or more with RTS mode because of aliasing, so you must use ETS ON when you display such waveform

2. Basic Operations

Change Vertical Scale(Volt/Div)

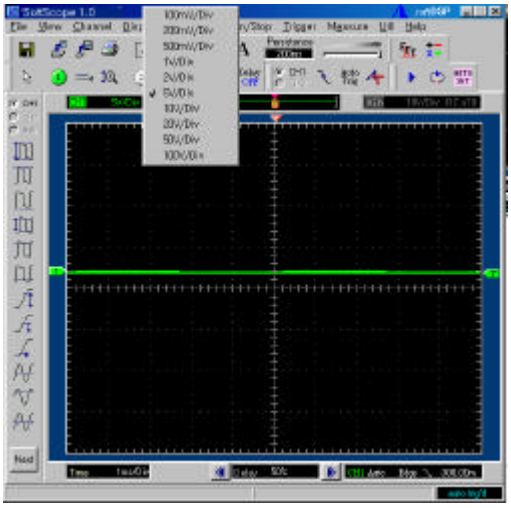
1. Change vertical scale(volt/div) from panel.

   A.

Push voltage scale change panel.

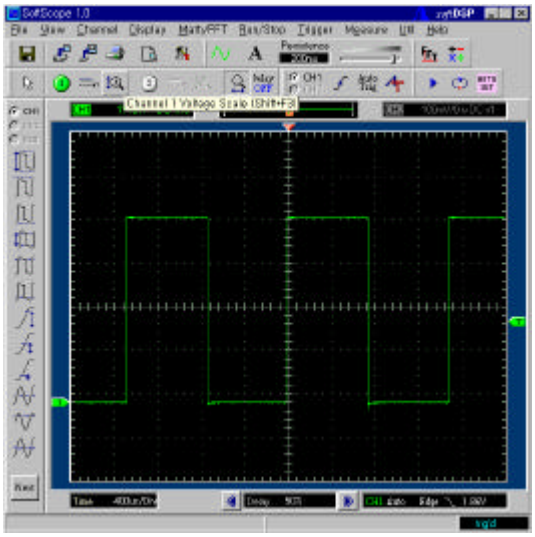
   B. Set the volt/div scale with mouse or keyboard.

   C. Vertical scale is changed.



2. Change vertical scale(volt/div) with mouse button.

   A.
Push voltage scale change icon.



B. Mouse icon is changed to number 1.

C. Push the left/right mouse button to change volt/div.

D. With mouse that supports scroll button, change the voltage offset.

3. Change vertical scale(volt/div) from menu and hot-key.

A. Channel →Ch1 Setting →Volt Scale

B. Press the appropriate hot-key.

4. Change AC/DC setting.

A. Push the AC/DC icon to change.

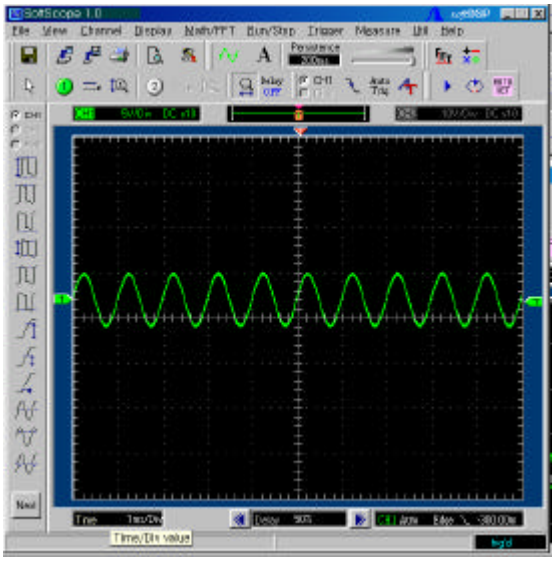
B. Push the same button once more to restore.

Change Horizontal Scale(Time/Div)

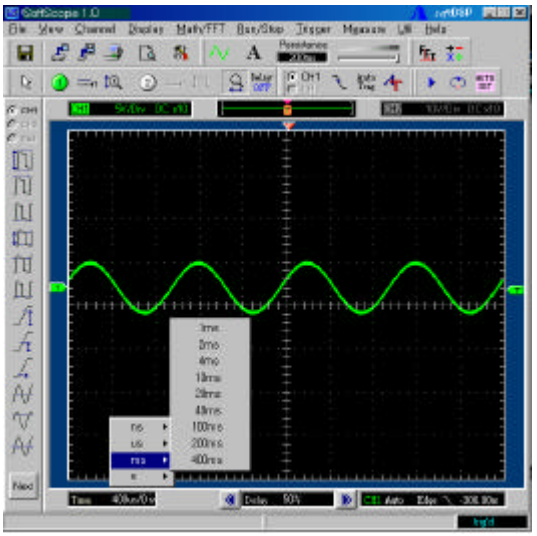
1. Change horizontal scale(time/div) from panel.

A.

Push time scale change panel.



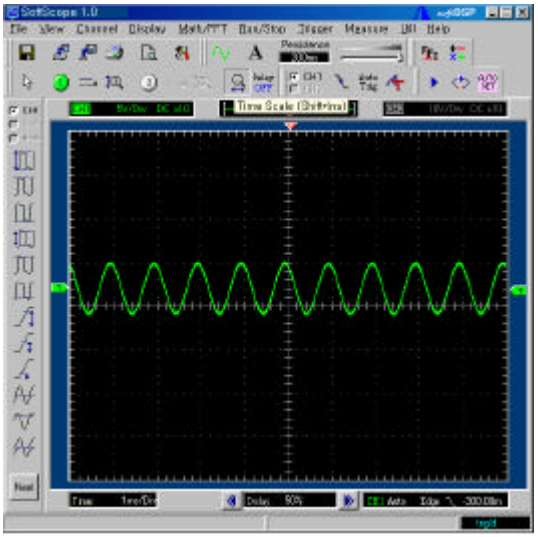
B. Set the time/div scale with mouse or keyboard.



C. Horizontal scale is changed.

2. Change horizontal scale(time/div) with mouse button.

A. Push time scale change icon.



B. Cursor is changed to “ T”.

C. Push the left/right mouse button to change volt/div.

D. With mouse that supports scroll button, change the trigger point.

3. Change horizontal scale(time/div) from menu and hot-key.

A. Channel → Time Scale.

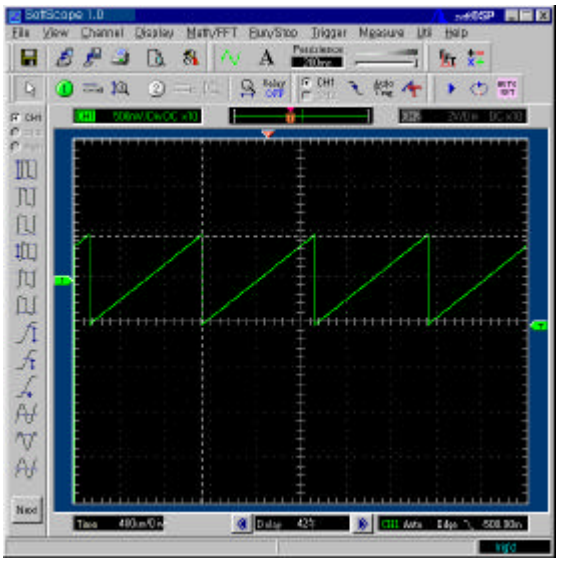
B. Press the appropriate hot-key.

Measurement Using Cursor

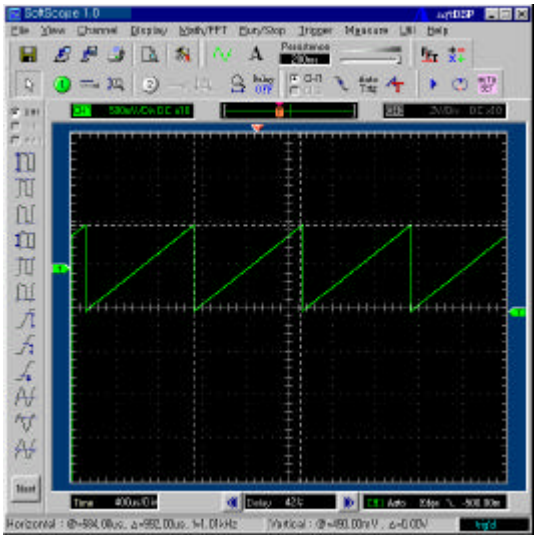
Measure voltage and time offset simply using mouse.

A. Push icon and the cursor is changed to cross .

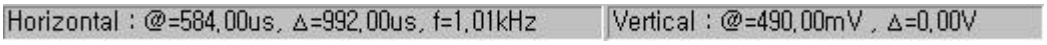
B. Push left mouse button, and the cross lines appear.



C. Drag the mouse button to the point you want to measure.



D. Release the left mouse button, the voltage difference and time difference will be shown at the status bar.



E. Push right mouse button, and the cross lines disappear.

Measurement by Icon

SDS 200 has many measurement functions.

Pk-Pk	-Peak-to-peak = Max – Min -Measured over the entire waveform
Max	-Voltage of the absolute maximum level -Measured over the entire waveform
Min	-Voltage of the absolute minimum level -Measured over the entire waveform
Amp	-Amp = Base – Top -Measured over the entire waveform
Base	-Voltage of the statistical minimum level -Measured over the entire waveform
Top	-Voltage of the statistical maximum level -Measured over the entire waveform
Upper threshold	-Voltage of the 90% level from base to top
Middle threshold	-Voltage of the 50% level from base to top
Lower threshold	-Voltage of the 10% level from base to top
Mean	-The arithmetic mean over the entire waveform
Cycle mean	-The arithmetic mean over the first cycle in the waveform
RMS	-The Root Mean Square voltage over the entire waveform

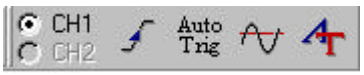
Cycle RMS	- The Root Mean Square voltage over the first cycle in the waveform
Positive Overshoot	- Positive Overshoot = (Max - Top)/Amp x 100 % - Measured over the entire waveform
Negative Overshoot	- Negative Overshoot = (Base - Min)/Amp x 100 % - Measured over the entire waveform
Period	- Time to take for the first signal cycle to complete in the waveform - Measured in seconds
Frequency	- Reciprocal of the period of the first cycle in the waveform - Measured in Hertz(Hz)
Rise time	- Time taken from lower threshold to upper threshold
Fall time	- Time taken from upper threshold to lower threshold
Positive Duty Cycle	- Positive Duty Cycle = (Positive Pulse Width)/Period x 100% - Measured of the first cycle in waveform
Negative Duty Cycle	- Negative Duty Cycle = (Negative Pulse Width)/Period x 100% - Measured of the first cycle in waveform
Positive Pulse Width	- Measured of the first positive pulse in the waveform - The time between the 50% amplitude points
Negative Pulse Width	- Measured of the first
Next	- View next icons

Change Trigger Level & Trigger Point

1.Set the trigger input source.

A. With only one channel on, trigger input source is automatically set to the channel. With 2 channels on, you can choose trigger input source between the two.

B. Change trigger source from the radio-button.



C. Change trigger source from menu bar.

EX) Trigger → Trigger Source CH1 or CH2

D. Change trigger input source using hot key.

2. Change the trigger level.

A. Move the trigger level icon, you can move the trigger level.

B. Input the trigger level from editor

3. Change the trigger point.

A. Move the trigger point icon, you can move the trigger point.

B. Input the trigger point from editor.

4. Change the trigger condition.

A. Push the trigger up/down icon to change trigger condition.

B. Use menu or hot-key. (Trigger → Trigger Up/Down)

5. Set delay on/off.

A.

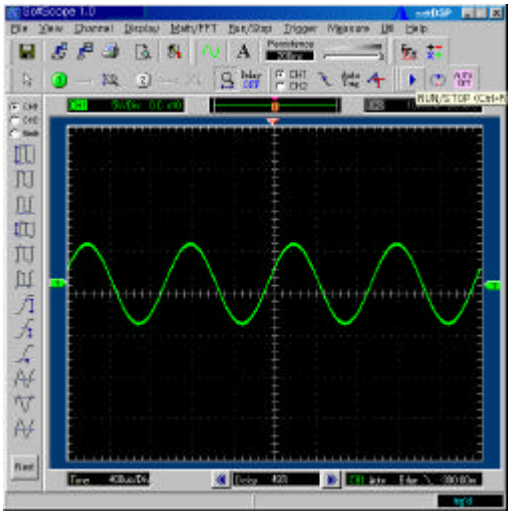
Push the delay button to set delay on or off.

B. When delay on, the trigger point separates from the horizontal expansion point. The horizontal expansion point stays at the center of the screen.

Single Shot/Stop Mode

1. Change state to stop or single shot.

A. Push the stop button , SDS200 is in stop state.

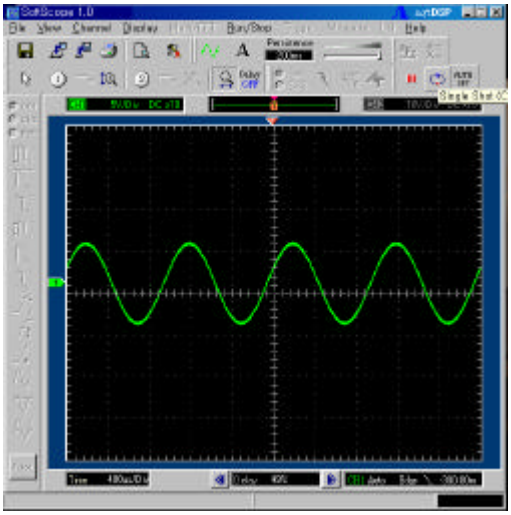


B. Every operation is the same as in the running state.

2. Single-shot action.

A. Push the single-shot button to acquire only 1 waveform after the trigger condition you set.

B. Single-shot is available only in Real Time mode.



C. Push the single-shot button again to pause, SDS 200 waits for the trigger signal again.

Put Label on The Screen

1. Add a label on the screen.

   A. Push the label icon.

   B. The mouse cursor is changed to 'I' shape.

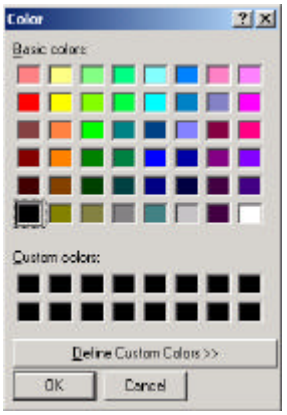
   C. Push the left mouse button.

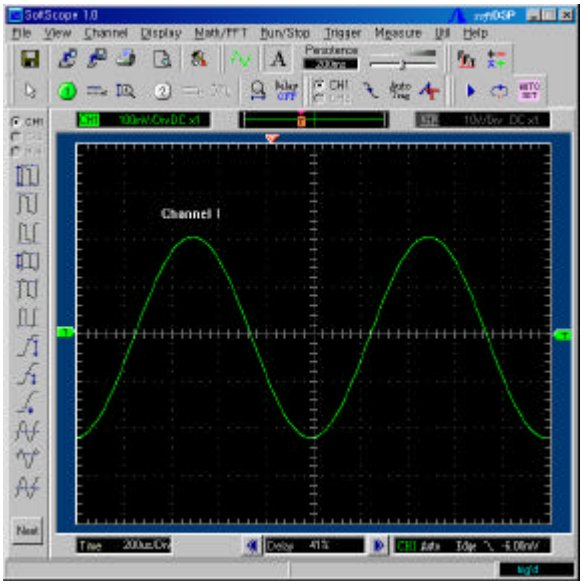
   D. Input string.

   E. Change the text/back color.

   F. Push the confirm button to finish.

   G. Change the label by clicking the label again.





Print/Save Waveform

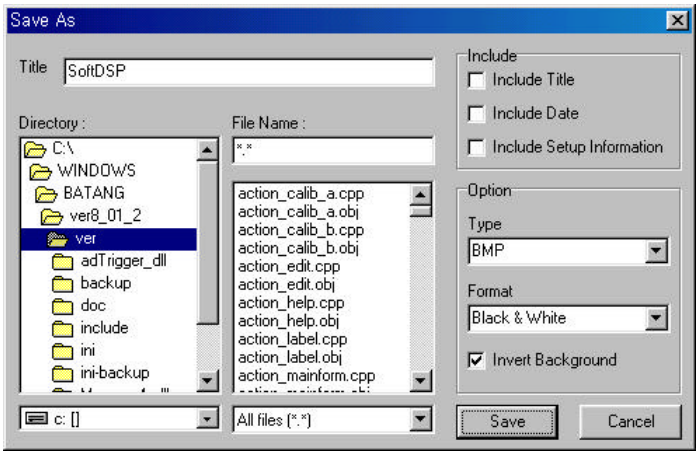
1. Save acquired waveform in the following formats.

A. Text File

B. JPG/BMP File

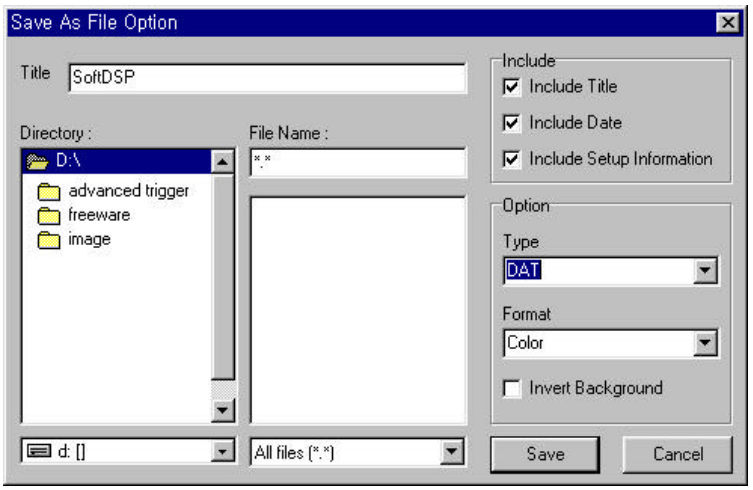
C. Excel File

D. Word File



2. Save as text format.

A. Push the save button and the dialog box appears.



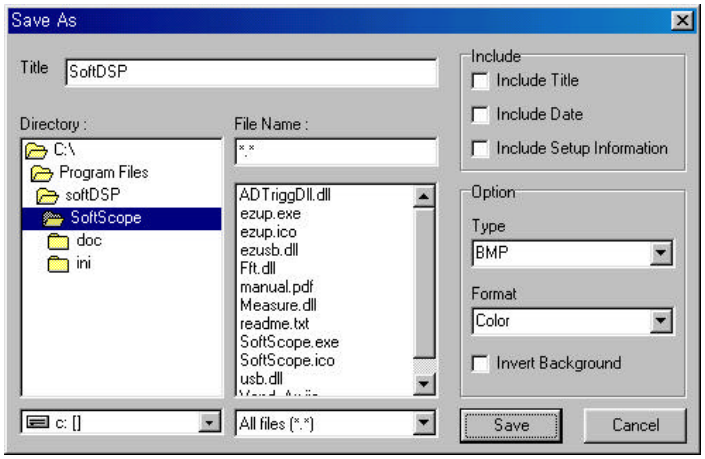
B. Enter the directory that you want to save the data file in.

C. Enter the name of data file that you want to save.

D. Select type 'DAT' at option.

E. Push the save button.

3. Save as JPG/BMP format.



A. Push the save button.

B. Enter the title you want to give.

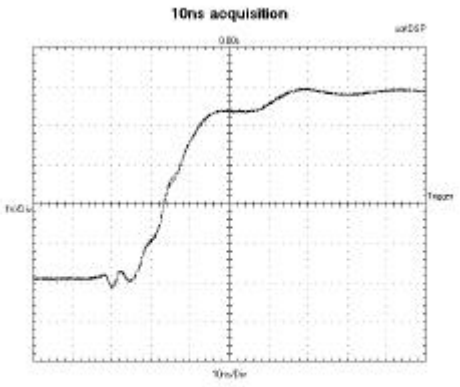
C. Enter the directory you want to save the data file in.

D. Enter the name of data file you want to save.

E. Select type 'BMP/JPG' at option.

F. Push the save button.

Example) Saved BMP File



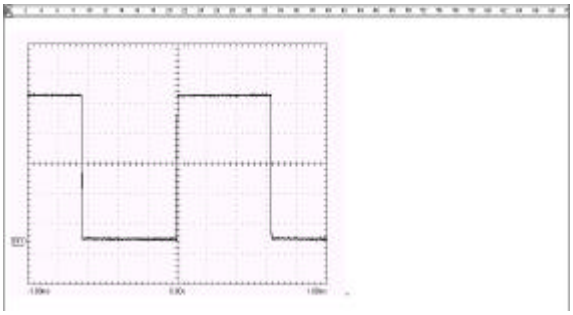
4. Copy the image into clipboard.

A. Select Copy from the File menu.

B. Waveform is copied into clipboard.

C. Paste the image into any program that supports clipboard paste.

Example). Copied to MS Word

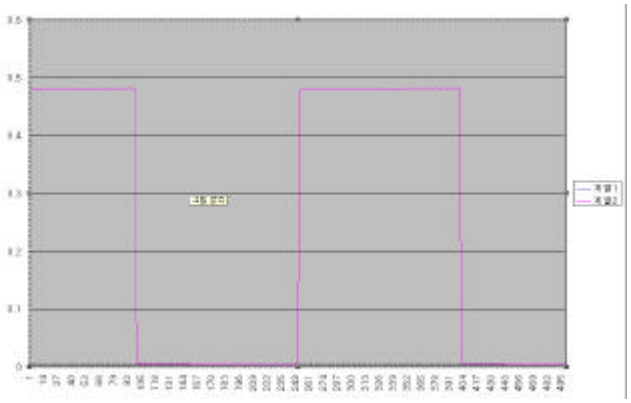


5. Transfer the data to MS Excel using ActiveX automation.

A. Select Copy at the File menu.

B. MS Excel is activated and then data is transferred by using ActiveX.

Example). Data transferred to MS Excel



6. You can save the data to MS Word using ActiveX automation.

A. Select Copy at the File menu.

B. MS Word is activated and then data is transferred by using ActiveX.

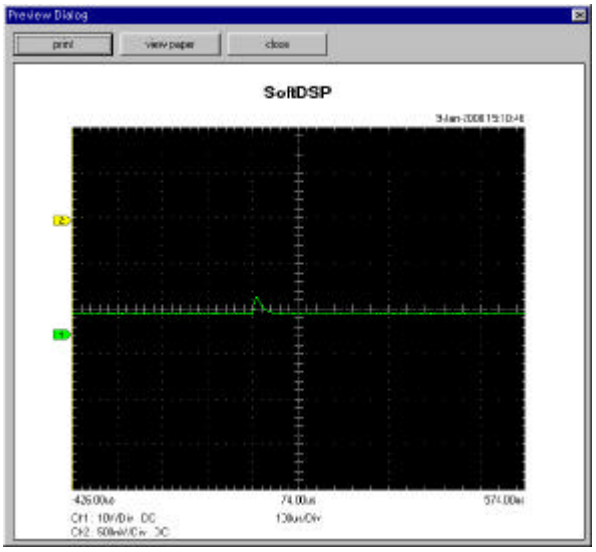
7. Print the waveform.

A. Push the print button.

B. Push the preview button to preview the image.

C. Push 'OK' button.

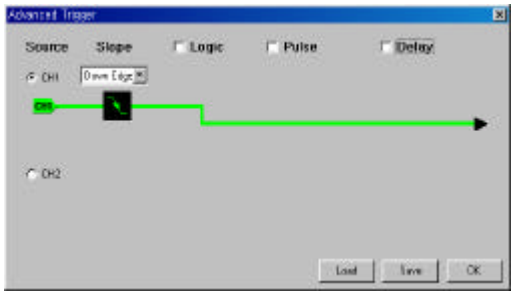
Example) Preview screen


Preview Dialog
print
view paper
close
SoftDSP

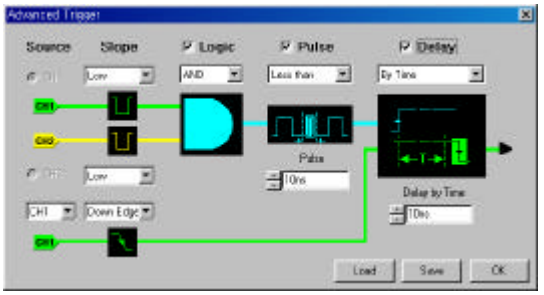
Ch 3. Advanced Technique

1. Advanced Trigger

You can return to normal trigger mode by uncheck Logic, Pulse, Delay check box in the advanced trigger dialog box.



(Normal trigger mode)



(Advanced trigger mode)

Edge Trigger

The Edge Trigger generates a trigger when the source signal passes through a specified level in either positive or negative direction, set by the user. This is the same trigger type found in a conventional analog oscilloscope. The source, the slope and the level must be set for Edge Trigger operation.

Source: CH1/CH2

-Selects the trigger source.

Slope: Up Edge/Down Edge

-Selects the slope of the source.

Level: +/- 4 vertical screen divisions (Full screen range)

-Selects the level of the input signal where the Edge Trigger is generated. The level is selected by trigger level pointer at the right-hand side of the display screen and the source is selected from the tool bar radio button.

Logic Trigger

The Logic Trigger generates a trigger depending on the logical relation between the state of the two input channels. AND, NAND, OR, NOR, XOR, XNOR Logic Triggers are available and the two input states can be negated if selected.

Ch1 state: High/Low

-Selects the state of channel 1 signal for Logic Trigger input

Ch2 state: High/Low

-Selects the state of channel 2 signal for Logic Trigger input

Logic type: AND, NAND, OR, NOR, XOR, XNOR

-Selects logic type

Pulse Trigger

The Pulse Trigger generates a trigger if the pulse width of the input signal is either less or more than the preset time.

Equation: Less than/More than

- Selects whether the trigger is generated when the pulse is less than or more than the preset pulse time value.

Time: 10ns ~ 167ms

- Selects the pulse width time

Delay Trigger

The Delay Trigger generates a trigger by waiting for a preset time or number of events after a primary trigger from combination of edge, logic and pulse trigger is generated and when the first trigger from the secondary trigger source is detected.

Equation: By time/By event

- Selects the delay condition either by time or by event.

Delay condition: By time (10ns ~ 167ms)/By event (1 ~ 16,777,215 events)

Secondary trigger source: CH1/CH2

- Selects the trigger source of the secondary trigger.

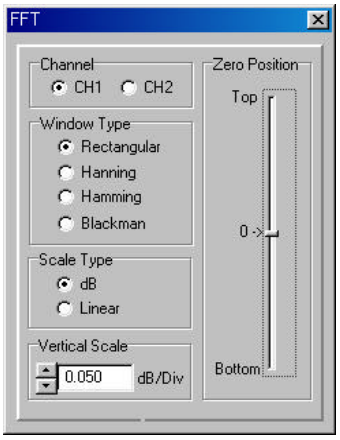
Secondary trigger slope: Rising/Falling

- Selects the slope of the secondary trigger.

2. FFT

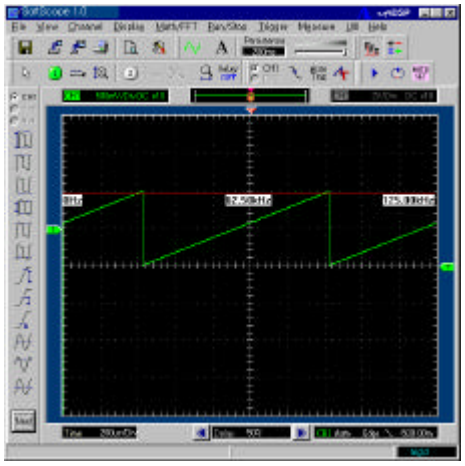
Analyze the frequency component of the waveform using FFT(Fast Fourier Transform).

1. Push the FFT icon, and the FFT dialog box is appears.



Channel	Sets input source to FFT analyze
Window Type	Sets digital filter type
Scale Type	Sets y scale to Linear or Log scale
Vertical Scale	Sets vertical scale
Vertical Scale	Sets offset

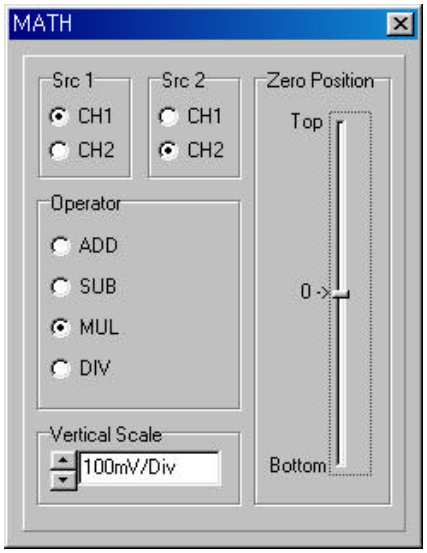
2. Move the FFT cursor over the FFT waveform to see the frequency component.



3. Math

Add/Subtract/Multiply/Divide the two waveforms.

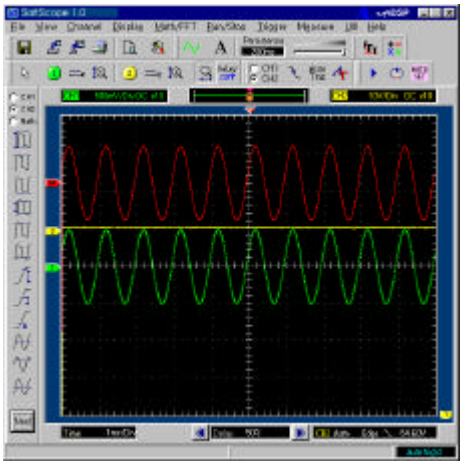
1. Push the Math icon.



Src1/Src2	Sets input source.
Operator	Sets operation method
Vertical Scale	Sets vertical scale
Zero Position	Sets offset

2. Select source 1, source 2 and operator from the dialog box.

Example) Input1 waveform + Input2 waveform



Ch 4. Toolbars, Menus, Dialog boxes & Screen Information

1. Toolbar

1. Save As	-Saves current waveform as dat, bmp or jpg file
2. Load State	-Loads state file into current state
3. Save State	-Saves current state to file
4. Print	-Prints current waveform
5. Preview	-Previews current waveform
6. Option	-Shows option dialog box
7. Line Join	-Joins the dots to lines
8.ETS ON/OFF	-Sets ETS(Equivalent Time Sampling) On/Off
9. Label	-Shows label on the screen
10. Persistence	-Sets persistence time
11. Intensity	-Sets intensity of the waveform
12. FFT	-Shows FFT dialog box
13. Math	-Shows Math dialog box
14. Cursor	-Shows measurement cursor
15. Channel 1 On / Off	-Sets channel 1 on -Sets channel 1 off
16. Channel 1 AC / DC	-Selects DC coupling -Selects AC coupling
17. Channel 1 Voltage Scale	-Changes vertical scale factor of Channel 1
18. Channel 2 On / Off	-Sets channel 2 on -Sets channel 2 off
19. Channel 2 AC / DC	-Selects DC coupling -Selects AC coupling
20. Channel 2 Voltage Scale	-Changes vertical scale factor of Channel 2

21. Time Scale	-Changes horizontal scale factor
22.Delay On / Off	-Sets trigger delay on -Sets trigger delay off
23. Trigger Source	-Sets trigger source to a specific channel
24. Trigger Up / Down	-Triggers on the rising edge of the signal -Triggers on the falling edge of the signal
25. Trigger auto / Normal	-Enables free running waveform acquisitions -Triggers only on valid trigger events
26. Advanced Trigger	-Shows advanced trigger dialog box
27. Run / Stop	-Starts waveform acquisitions -Stops waveform acquisitions
28. Single Shot	-Executes a single-shot acquisition
29. Autoset	-Adjusts the vertical, horizontal, and trigger controls for a usable display automatically

2. Menu

File

Name	Sub Menu	Operation	Hot-key
Load State		Loads file to current file	F2
Save State		Saves current state to file	F3
Save As		Saves waveform as bmp, jpg, dat file	Ctrl +S
Save As Word		Saves waveform as word file	F4
Save As Excel		Saves waveform as excel file	F5
Copy		Saves waveform to clipboard	Ctrl + C
Option		Selects the waveform or screen option	F6
Preview		Previews the waveform	F7
Print		Prints the waveform	Ctrl + P
Exit		Stops the SoftScope and return	Ctrl + X

View

Name	Sub Menu	Operation	Hot-key
File Toolbar		Shows/Hides File Toolbar	Ctrl + F1
Display Toolbar		Shows/Hides Display Toolbar	Ctrl + F2

FFT/Math Toolbar		Shows/Hides FFT/Math Toolbar	Ctrl + F3
Channel Toolbar		Shows/Hides Channel Toolbar	Ctrl + F4
Trigger Toolbar		Shows/Hides Trigger Toolbar	Ctrl + F5
Run/Stop Toolbar		Shows/Hides Run/Stop Toolbar	Ctrl + F6

Channel

Name	Sub Menu	Operation	Hot-key
CH1 Setting	On/Off	Changes ON/OFF	Shift + F1
	AC/DC	Changes AC/DC	Shift + F2
	Volt Scale	Increases/Decreases Voltage	Shift + F3
	Select Volt/Div	Changes Volt/Div	Shift + F4
	Probe Attenuation	Changes Probe Attenuation	Shift + F5
			Shift + F6
CH2 Setting	On/Off	Changes ON/OFF	Shift + F7
	AC/DC	Changes AC/DC	Shift + F8
	Volt Scale	Increases/Decreases Voltage	Shift + F9
	Select Volt/Div	Changes Volt/Div	Shift + F10
	Probe Attenuation	Changes Probe Attenuation	Shift + F11
			Shift + F12
Time Scale		Increases/Decreases Time/Div	Shift + Ins
Select Time		Changes Time	Ctrl + T
Delay On/Off		Changes Delay ON/OFF	Ctrl + D
Cursor		Changes Cursor ON/OFF	Ctrl + U

Display

Name	Sub Menu	Operation	Hot-key
Line Join		Joins the waveform with line	Ctrl + J
ETS On/Off		Sets ETS On/Off	Ctrl + O
Label		Inserts text to waveform	Ctrl + L
Persistence		Changes the persistence effect	Ctrl + E
Intensity +		Increases intensity of waveform	Ctrl + Inc
Intensity -		Decreases intensity of waveform	Ctrl + Del

Math/FFT

Name	Sub Menu	Operation	Hot-key
Math		Calculates several signal	Ctrl + M
FFT		Changes signal to FFT	Ctrl + F

Run/Stop

Name	Sub Menu	Operation	Hot-key
Run/Stop		Starts/Stops acquiring waveform	Ctrl + R
Single Shot		Begins Single Shot operation	Ctrl + H
Auto Set		Changes horizontal/vertical scale for waveform	Ctrl + A

Trigger

Name	Sub Menu	Operation	Hot-key
Trigger Source CH1		Selects CH1 from trigger source	Shift+Ctrl+F1
Trigger Source CH2		Selects CH2 from trigger source	Shift+Ctrl+F2
Trigger Up/Down		Selects Up/Down from Trigger Up/Down	Shift+Ctrl+F3
Normal/Auto		Selects Normal/Auto from Trigger Normal/Auto	Shift+Ctrl+F4
Advanced Trigger		Selects Advanced trigger	Shift+Ctrl+F5

Measure

Name	Sub Menu	Operation	Hot-key
Volt	Peak to Peak	Measurement of Peak to Peak Voltage	Ctrl+Alt + P
	Maximum	Measurement of Maximum Voltage	Ctrl+Alt + X
	Minimum	Measurement of Minimum Voltage	Ctrl+Alt + N
	Amplitude	Measurement of Amplitude Voltage	Ctrl+Alt + A
	Top	Measurement of Top Voltage	Ctrl+Alt + T
	Base	Measurement of Base Voltage	Ctrl+Alt + B
	Upper	Measurement of Upper Voltage	Ctrl+Alt + U
	Middle	Measurement of Middle Voltage	Ctrl+Alt + M
	Lower	Measurement of Lower Voltage	Ctrl+Alt + L
	Mean	Measurement of Mean Voltage	Ctrl+Alt + E
	Cycle Mean	Measurement of Cycle Mean Voltage	Ctrl+Alt + C

	RMS	Measurement of RMS Voltage	Ctrl+Alt + R
	Cycle RMS	Measurement of Cycle RMS Voltage	Ctrl+Alt + Y
	Positive Overshoot	Measurement of Positive Overshoot Voltage	Ctrl+Alt + S
	Negative Overshoot	Measurement of Negative Overshoot Voltage	Ctrl+Alt + G
Time	Period	Measurement of Period	Ctrl+Alt + I
	Frequency	Measurement of Frequency	Ctrl+Alt + F
	Rise Time	Measurement of Rise Time	Ctrl+Alt + R
	Fall Time	Measurement of Fall Time	Ctrl+Alt + Z
	Positive Duty Cycle	Measurement of Positive Duty Cycle	Ctrl+Alt + E
	Negative Duty Cycle	Measurement of Negative Duty Cycle	Ctrl+Alt + D
	Positive Pulse Width	Measurement of Positive Pulse Width	Ctrl+Alt + W
	Negative Pulse Width	Measurement of Negative Pulse Width	Ctrl+Alt + H

Util

Name	Sub Name	Operation	Hot-key
Zero Calibration		Begins offset calibration	Shift+Ctrl+F6

Help

Name	Sub Name	Operation	Hot-key
Help		Shows help file	F1
About		Displays about Dialog Box	F9

3. Screen Information

SoftScope has the following windows to show the internal states and settings.

1.

: Channel 1 Information window
   A. Click on this window, to change the voltage setting.
   B. The following information is displayed.
      a. Volt/Div
      b. AC/DC coupling
      c. 1:1/10:1 probe

2.

: Channel 2 Information window
   A. Same as channel 1

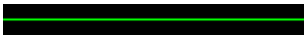
3.

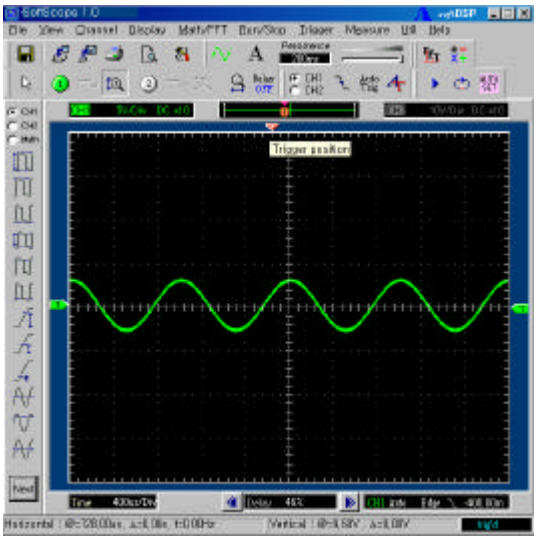
: Time information window
   A. Click on this window to change the time setting.
   B. The current time/div setting is displayed.

4. : Trigger point information window
   A.

When SDS 200 is in a delay-on state it shows the current trigger point using time dimension.
   B.

When SDS 200 is in a delay-off state it shows the current trigger point using % scale.

5. : Trigger point display window
   A. The trigger point shows the trigger position in the acquired waveform.
   B.  This line shows the whole acquired waveform.
   C. You can see the data currently showing using [ ] mark.
   D. This mark shows the reference point when horizontal scale(time/div) is changed.



6.

: Trigger state selection tool bar

   A.

Trigger source selection radio button

   B.

Trigger mode (Auto/Normal)

   C.
Trigger condition (Up edge/Down edge)

   D.

Triger state display window.

7.

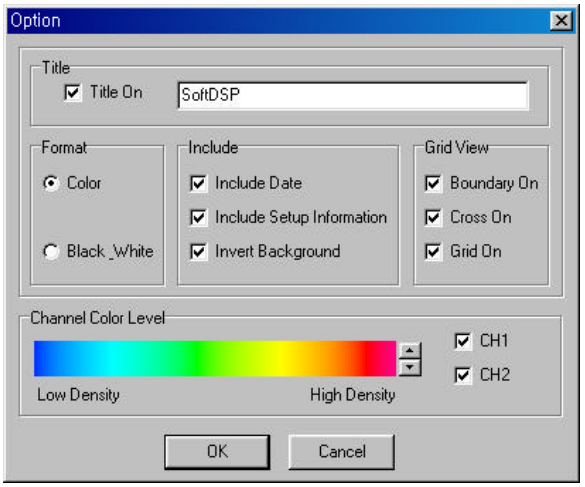
: Trigger state of current acquired waveform

   A. 'Auto trig'd' - Trigger signal is automatically generated because of no valid triggered signal.

   B. Waiting – SDS 200 is waiting for the incoming trigger.

   C. Trig'd – Acquired waveform is triggered.

4. Option Dialog Box



Title On	-Check to include title on file/print output
Title	-Use to set the title on file/print output
Format	-Sets color or Black or white type
Include	-Check to include informations
Grid View	-Sets the graticule type
Channel Color Level	-Sets color level of waveform -Check to display waveform in color

Ch 5. Appendix

1. Three Operational Modes of SDS 200

Realtime mode

In realtime mode SDS 200 acquires 10,000 sample data from the input source.

It can show the real data simultaneously. But because of the sampling speed limit of A/D converter, it is limited only to 10us/div time/div.

ETS(Equivalent Time Sampling) mode

In ETS mode SDS acquires waveform as well as TDC value, and rearrange the waveforms using the TDC value to form one waveform.

For example, with first acquisition sampled data forms waveform A. With second acquisition sampled forms waveform B. Over and over again waveforms are interpolated to give a complete waveform. SDS 200 has a 200ps time resolution in ETS mode.

Roll mode

To handle low frequency signals, SDS 200 has a roll mode. In roll mode acquired waveform is displayed and moved from the right side of the screen to the left. As a result, it appears that the waveform is moving constantly.

SDS 200 operates each mode in the following time scale base:

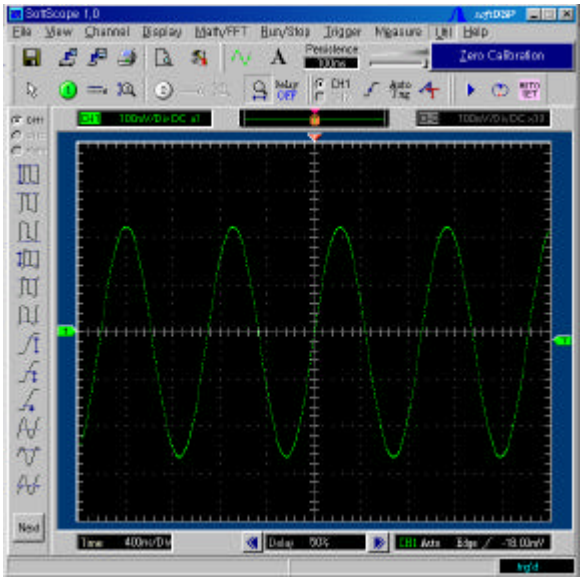
Time/Div	2ns~4us	10us~400ms	1s~10s
Sampling Mode	ETS mode	Realtime Mode	Roll Mode

2. Software Calibration

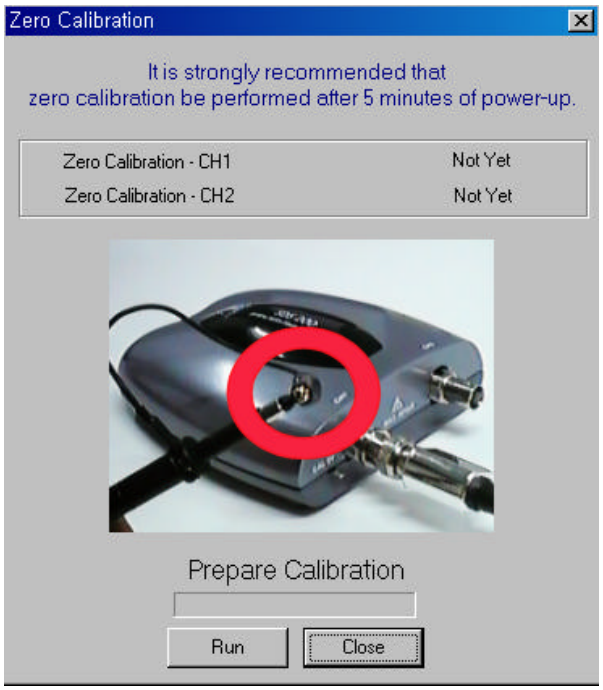
It is necessary for you to calibrate regularly to make the measurements as accurate as possible

1. Short input signal as shown below.

2. Select Zero Calibration from menu.



3. Zero calibration dialog box appears.

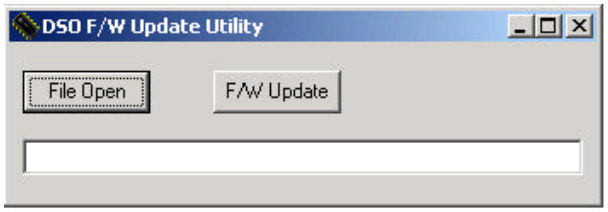


4. Calibration is done automatically.

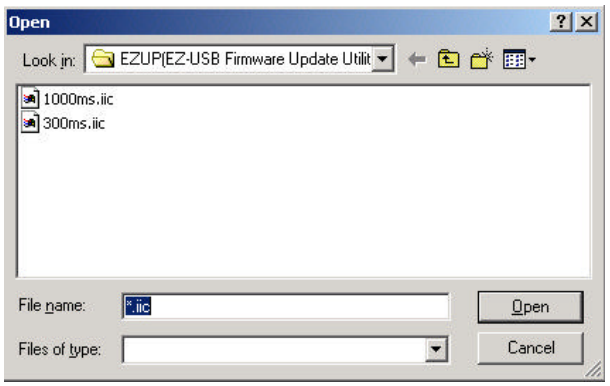
3. Firmware Update

You can download new firmware from softDSP website(www.softdsp.com).

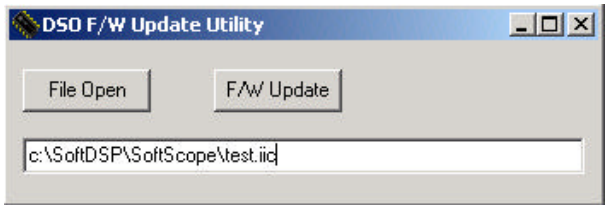
1. Connect SDS 200 to PC.
2. Download a new firmware. (.iic file format)
3. Run ezup.exe software.



4. Select File Open.



5. From Dialog Box choose the firmware(.iic) file.



6. Select

, F/W update.

7. Firmware is updated automatically.